FILE 'HOME' ENTERED AT 12:30:16 ON 08 APR 2002

=> file medline biosis biotechno

COST IN U.S. DOLLARS	SINCE FILE ENTRY	TOTAL SESSION
FULL ESTIMATED COST	0.21	0.21

FILE 'MEDLINE' ENTERED AT 12:30:30 ON 08 APR 2002

FILE 'BIOSIS' ENTERED AT 12:30:30 ON 08 APR 2002

FILE 'BIOTECHNO' ENTERED AT 12:30:30 ON 08 APR 2002

=> s hedgehog and (stroke or infarct? or ischaem?)

L1 8 HEDGEHOG AND (STROKE OR INFARCT? OR ISCHAEM?)

=> dup rem l1

PROCESSING COMPLETED FOR L1
L2 6 DUP REM L1 (2 DUPLICATES REMOVED)

=> d ibib abs 1-6

L2 ANSWER 1 OF 6 BIOTECHNO COPYRIGHT 2002 Elsevier Science B.V.
ACCESSION NUMBER: 2000:30810915 BIOTECHNO
TITLE: The decade of the brain: A brief review
AUTHOR: Tandon P.N.
CORPORATE SOURCE: Dr. P.N. Tandon, Department of Neurosurgery, All India Inst. of Medical Sciences, Neuroscience Centre, New Delhi 110029, India.
SOURCE: Neurology India, (2000), 48/3 (199-207), 99 reference(s)
CODEN: NURYAY ISSN: 0028-3886
DOCUMENT TYPE: Journal; General Review
COUNTRY: India
LANGUAGE: English
SUMMARY LANGUAGE: English
AN 2000:30810915 BIOTECHNO
AB Recognising the huge burden of neurological and psychiatric disorders and prompted by the potentials of new techniques of molecular biology, biotechnology, genetics and imaging to study these, the 1990s were declared the 'decade of the brain'. This stimulated global scientific efforts to understand the human brain in health and disease. This review summarises some of the major research achievements during the decade. While it is impossible to provide a comprehensive summary of the voluminous data that has been generated, it was decided to provided a bird's eye view of the recent advances in the fields of developmental neurobiology, neurogenetics, neurochemistry and imaging of the brain, which have direct relevance for the clinicians.

L2 ANSWER 2 OF 6 BIOSIS COPYRIGHT 2002 BIOLOGICAL ABSTRACTS INC.
ACCESSION NUMBER: 2001:88086 BIOSIS
DOCUMENT NUMBER: PREV200100088086
TITLE: Human neural stem cells transfected with Nurr1 gene express dopaminergic phenotype.
AUTHOR(S): Lee, M. A. (1); Lee, H. S.; Jung, S. H.; Park, S. Y.; Huh, S. O.; Ryu, J. K.; Kim, H. J.; Jin, B. K.; Ichinose, H.; Kim, S. U.
CORPORATE SOURCE: (1) Ajou University, Suwon South Korea
SOURCE: Society for Neuroscience Abstracts, (2000) Vol. 26, No. 1-2, pp. Abstract No.-313.7. print.

Meeting Info.: 30th Annual Meeting of the Society of Neuroscience New Orleans, LA, USA November 04-09, 2000 Society for Neuroscience . ISSN: 0190-5295.
DOCUMENT TYPE: Conference
LANGUAGE: English
SUMMARY LANGUAGE: English
AB Neural stem cells(NSCs) of the CNS have recently aroused a great deal of interest not only because of their importance in basic neural development but also their therapeutic potential for neurological diseases such as Parkinson disease and **stroke**. During the CNS development, specification of midbrain DA system is determined by two molecular cascades.In one pathway,FGF-8,sonic **hedgehog** and transcription factor Nurr1 specify DA neurotransmitter phenotype, and in the another, transcription factors Lmx1b and Ptx3 are important. In Nurr1 knock-out mouse, TH positive cells fail to appear in substantia nigra, indicating that Nurr1 is essential in specification of DA phenotype. In this study, we used immortalized human NSCs retrovirally transduced with Nurr1 gene to probe the Nurr1-mediated mechanism to induce DA phenotype. While Nurr1 overexpression alone did not generate DA phenotype in NSCs, application of retinoid and foskolin induced expression of TH and AADC mRNAs. In addition, co-cultures of Nurr1 expressing NSCs with human astrocytes induced a marked increase of TH expression. In this co-culture system, addition of retinoids and foskolin dramatically increased expression of TH. These results indicate that the immortalized human NSCs with Nurr1 gene have the clinical utility for cell replacement for patients suffering from Parkinson disease(supported by KOSEF)

L2 ANSWER 3 OF 6 MEDLINE DUPLICATE 1
ACCESSION NUMBER: 96426701 MEDLINE
DOCUMENT NUMBER: 96426701 PubMed ID: 8828980
TITLE: How often has Lp(a) evolved?.
AUTHOR: Lawn R M
CORPORATE SOURCE: Falk Cardiovascular Research Center, Stanford University School of Medicine, CA 94305-5246, USA.
SOURCE: CLINICAL GENETICS, (1996 Apr) 49 (4) 167-74. Ref: 61
Journal code: DDT; 0253664. ISSN: 0009-9163.
PUB. COUNTRY: Denmark
Journal; Article; (JOURNAL ARTICLE)
General Review; (REVIEW)
(REVIEW, TUTORIAL)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 199612
ENTRY DATE: Entered STN: 19970128
Last Updated on STN: 19970128
Entered Medline: 19961210
AB The lipoprotein Lp(a) is associated with increased risk of atherosclerosis and myocardial **infarction** in humans. Lp(a) is mostly confined to primate species, due to the limited phylogenetic distribution of its distinguishing protein component, apolipoprotein(a) which is a close homolog of plasminogen. The known properties of Lp(a) are reviewed here. Many of these derive from the ability of Lp(a) to bind to the same substrates as plasminogen. A possible new animal model of Lp(a) is the **hedgehog**, which contains an Lp(a)-like particle that is the apparent product of independent evolution of a multi-kringle, apolipoprotein(a)-like protein by duplication and modification of portions of the **hedgehog** plasminogen gene.

L2 ANSWER 4 OF 6 BIOSIS COPYRIGHT 2002 BIOLOGICAL ABSTRACTS INC.
ACCESSION NUMBER: 1990:306869 BIOSIS
DOCUMENT NUMBER: BA90:25836
TITLE: ADAPTATIONS OF THE OSTEOMUSCULAR SYSTEM IN EVOLUTION OF SORICOMORPHA 1. DIGGING APPARATUS.
AUTHOR(S): NIKOL'SKII V S
CORPORATE SOURCE: BIOL. FAC., MOSC. STATE UNIV., MOSCOW, USSR.
SOURCE: ZOOL ZH, (1990) 69 (1), 116-125.
CODEN: ZOLZAT. ISSN: 0044-5134.
FILE SEGMENT: BA; OLD

LANGUAGE: Russian

AB Studies of the locomotory system of hedgehogs, moles and shrews prompted a scheme of evolutionary adaptive transformations in the digging apparatus of moles. The digging manner typical of moles and consisting of a lateral **stroke** of the fore extremities is inherited from ancient Soricomorpha, their locomotion is still retained by the shrews. In the latter case the horizontal position of the extremities is utilized in moving inside a limited space of natural cavities which are usually shaped as horizontal trenches.

L2 ANSWER 5 OF 6 BIOSIS COPYRIGHT 2002 BIOLOGICAL ABSTRACTS INC.
ACCESSION NUMBER: 1990:372960 BIOSIS
DOCUMENT NUMBER: BA90:59641
TITLE: ADAPTIVE TRANSFORMATIONS OF THE OSTEO-MUSCULAR SYSTEM IN THE EVOLUTION OF SORICOMORPHA 2. THE JAW APPARATUS.
AUTHOR(S): NIKOL'SKII V S
CORPORATE SOURCE: BIOL. FAC., MOSCOW STATE UNIV., MOSCOW, USSR.
SOURCE: ZOOL ZH, (1990) 69 (3), 81-90.
CODEN: ZOLZAT. ISSN: 0044-5134.
FILE SEGMENT: BA; OLD
LANGUAGE: Russian

AB The study of the jaw apparatus structure in hedgehogs, moles and shrews was completed by a biomechanical analysis. The crucial point in splitting the unique stem Soricomorpha into two branches (moles and shrews) was the formation of a unique digging apparatus in moles with a lateral **stroke** as a main component. The jaw apparatus transformations were subordinate in their nature and were urged by the specific environment of the natural cavities.

L2 ANSWER 6 OF 6 MEDLINE
ACCESSION NUMBER: 86108432 MEDLINE
DOCUMENT NUMBER: 86108432 PubMed ID: 4085517
TITLE: Ventricular repolarization and fibrillation threshold in hibernating species.
AUTHOR: Johansson B W
SOURCE: EUROPEAN HEART JOURNAL, (1985 Nov) 6 Suppl D 53-62.
Journal code: EM8; 8006263. ISSN: 0195-668X.
PUB. COUNTRY: ENGLAND: United Kingdom
Journal; Article; (JOURNAL ARTICLE)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 198603
ENTRY DATE: Entered STN: 19900321
Last Updated on STN: 19900321
Entered Medline: 19860311

AB Hibernators are resistant to ventricular fibrillation (VF) induced by hypothermia. This is in contrast to non-hibernating mammals which develop circulatory arrest, usually VF, in the temperature region 15-20 degrees C. The **hedgehog** which is a hibernator showed resistance to VF also when VF-evoking procedures other than hypothermia were used, such as local application of aconitine on the epicardium, administration of 0.55 M CaCl2 to isolated hearts perfused with a potassium-free modified Tyrode solution, injection of procaine HCl into isolated hearts perfused with a modified Tyrode solution after previous adrenaline administration, and ligation of the left descending coronary artery. Electrical stimulation in the vulnerable period produced VF in some but not in all the hedgehogs but a greater current was necessary than in guinea-pigs, all of which developed VF. Factors of possible importance to explain this difference in VF resistance are the QT duration which is short in hibernators, adrenergic innervation (ventricular muscle fibres in hibernators lack sympathetic innervation), metabolic factors (different temperature activity curves in hibernators compared to nonhibernating mammals) and ultrastructure (less skeletin filament in the conduction system of the **hedgehog** heart).

=> s cerebral infarct volume

L3 79 CEREBRAL INFARCT VOLUME

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=> l2

L2 IS NOT A RECOGNIZED COMMAND
The previous command name entered was not recognized by the system.
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"HELP COMMANDS" at an arrow prompt (=>).

=> d his


     (FILE 'HOME' ENTERED AT 12:30:16 ON 08 APR 2002)

     FILE 'MEDLINE, BIOSIS, BIOTECHNO' ENTERED AT 12:30:30 ON 08 APR 2002
L1             8 S HEDGEHOG AND (STROKE OR INFARCT? OR ISCHAEM?)
L2             6 DUP REM L1 (2 DUPLICATES REMOVED)
L3            79 S CEREBRAL INFARCT VOLUME
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L1: Entry 5 of 20 File: USPT Aug 7, 2001

US-PAT-NO: 6271363
DOCUMENT-IDENTIFIER: US 6271363 B1

TITLE: Nucleic acids encoding hedgehog proteins

DATE-ISSUED: August 7, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ingham; Philip W.	Summertown			GBX
McMahon; Andrew P.	Lexington	MA		
Tabin; Clifford J.	Cambridge	MA		

US-CL-CURRENT: 536/23.5; 435/69.1, 530/300, 530/350, 536/23.1, 536/23.51

CLAIMS:

What is claimed is:

1. An isolated nucleic acid encoding a hedgehog polypeptide comprising an amino acid sequence at least 80 percent identical to an amino acid sequence selected from the group consisting of residues 27-425 of SEQ ID NO:8, residues 1-336 of SEQ ID NO: 10, residues 25-437 of SEQ ID NO: 11, residues 24-418 of SEQ ID NO:: 12, residues 24-475 of SEQ ID NO: 13 and residues 1-312 of SEQ ID NO: 14, which polypeptide binds to a naturally occurring patched receptor.

2. An isolated nucleic acid encoding a polypeptide selected from the group consisting of Sonic hedgehog polypeptide and Indian hedgehog polypeptide, wherein said hedgehog polypeptide comprises an amino acid sequence encoded by a nucleic acid which hybridizes under stringent conditions, including a wash step of 0-2.times.SSC at 65.degree. C., to a nucleic acid sequence selected from the group consisting of SEQ ID. NO. 1, SEQ ID. NO. 3, SEQ ID. NO. 4, SEQ ID. NO. 5, SEQ ID. NO. 6, and SEQ ID. NO. 7, which amino acid sequence binds to a naturally occurring patched receptor.

3. An isolated nucleic acid encoding a polypeptide selected from the group consisting of Sonic hedgehog polypeptide and Indian hedgehog polypeptide, wherein said hedgehog polypeptide comprises an amino acid sequence at least 80% identical to an amino acid sequence selected from the group consisting of SEQ ID. NO. 8, SEQ ID. NO. 10, SEQ ID. NO. 11, SEQ ID. NO. 12, SEQ ID. NO. 13, and SEQ ID. NO. 14, which amino acid sequence binds to a naturally occurring patched receptor.

4. The nucleic acid of any one of claims 2 or 3, which nucleic acid encodes a fragment of the N-terminal half of a Sonic hedgehog polypeptide, which polypeptide promotes proliferation of chondrocytes.

5. The nucleic acid of any one of claims 2 or 3, which nucleic acid encodes a fragment of the N-terminal half of a Indian hedgehog polypeptide, which polypeptide promotes proliferation of testicular germ line cells.

6. The nucleic acid of any one of claims 2 or 3, wherein said hedgehog polypeptide

promotes at least one of proliferation, survival, or differentiation of mesodermal tissue.

7. The nucleic acid of claim 6, wherein said mesodermal tissue is the dorsal mesoderm.

8. The nucleic acid of any one of claims 2 or 3, wherein said hedgehog polypeptide promotes at least one of proliferation, survival or differentiation of ectodermal tissue.

9. The nucleic acid of claim 8, wherein said hedgehog polypeptide is from a tissue selected from the group consisting of neural tube, neural crest or head mesenchyme.

10. The nucleic acid of any one of claims 2 or 3, wherein said hedgehog polypeptide promotes at least one of proliferation, survival or differentiation of endodermal tissue.

11. The nucleic acid of claim 10, wherein said hedgehog polypeptide is from the primitive gut.

12. The nucleic acid of any one of claims 2 or 3, wherein said hedgehog polypeptide can induce expression of secondary signaling molecules selected from the group consisting of members of the TGF.beta. family and members of the FGF family.

13. The nucleic acid of any one of claims 2 or 3, wherein said hedgehog nucleic acid comprises a nucleotide sequence selected from the group consisting of SEQ ID NO: 1, SEQ ID NO: 3, SEQ ID NO: 4, SEQ ID NO: 5, SEQ ID NO: 6 and SEQ ID NO: 7.

14. The nucleic acid of any one of claims 2 or 3, wherein said hedgehog nucleic acid encodes a sonic hedgehog (Shh) polypeptide as set forth in SEQ ID NO: 40.

15. The nucleic acid of any one of claims 2 or 3, wherein said hedgehog nucleic acid encodes an Indian hedgehog (Ihh) polypeptide as set forth in SEQ ID NO: 10.

16. The nucleic acid of any one of claims 2 or 3, wherein said hedgehog polypeptide further comprises a heterologous amino acid sequence.

17. The nucleic acid of any one of claims 2 or 3, wherein said amino acid sequence is encoded by a naturally occurring vertebrate Sonic hedgehog gene.

18. The nucleic acid of claim 17, wherein said Sonic hedgehog gene is a mammalian Sonic hedgehog gene.

19. The nucleic acid of claim 18, wherein said Sonic hedgehog gene is a human Sonic hedgehog gene.

20. The nucleic acid of any one of claims 2 or 3, wherein said amino acid sequence includes at least 150 amino acid residues of the N-terminal half of a hedgehog protein.

21. The nucleic acid of any one of claims 2 or 3, wherein said amino acid sequence is encoded by a naturally occurring vertebrate Indian hedgehog gene.

22. The nucleic acid of claim 21, wherein said Indian hedgehog gene is a mammalian Indian hedgehog gene.

23. The nucleic acid of claim 21, wherein said Indian hedgehog gene is a human Indian hedgehog gene.

24. The nucleic acid of any one of claims 2 or 3, wherein said patched receptor is a patched receptor of a vertebrate organism.

25. The nucleic acid of any one of claims 2 or 3, wherein said polypeptide promotes differentiation of neuronal cells or survival of differentiated neuronal cells.

26. The nucleic acid of claim 25, wherein said neuronal cell is a dopaminergic neuron.

27. The nucleic acid of claim 26, wherein said neuronal cell is a motorneuron.

28. The nucleic acid of any one of claims 2 or 3, wherein said polypeptide promotes proliferation of chondrocytes.

29. The nucleic acid of any one of claims 2 or 3, wherein said polypeptide induces expression of BMP-2, BMP-4, or Hoxd genes.

30. The nucleic acid of any one of claims 2-3, wherein said polypeptide is post-translationally modified.

31. The polypeptide of claim 30, wherein said polypeptide is post-translationally modified with one or more of glycosyl groups, lipids, phosphate groups and acetyl groups.

32. The nucleic acid of any one of claims 2-3, wherein said polypeptide is purified to at least 95% by dry weight.

33. The nucleic acid of any one of claims 2-3, wherein said polypeptide is purified to at least 80% by dry weight.

34. The nucleic acid of any one of claims 2-3, wherein said amino acid sequence includes at least 150 contiguous amino acids of the N-terminal half of the hedgehog polypeptide.

35. The nucleic acid of any one of claims 2-3, wherein said amino acid sequence includes at least 100 contiguous amino acids of the N-terminal half of the hedgehog polypeptide.

36. The nucleic acid of any one of claims 2-3, wherein said amino acid sequence includes at least 50 contiguous amino acids of the N-terminal half of the hedgehog polypeptide.

37. An isolated nucleic acid of claim 3, wherein said hedgehog polypeptide comprises an amino acid sequence at least 90% identical to an amino acid sequence selected from the group consisting of SEQ ID. NO. 8, SEQ ID. NO. 10, SEQ ID. NO. 11, SEQ ID. NO. 12, SEQ ID. NO. 13, and SEQ ID. NO 14.

38. An isolated nucleic acid of claim 3, wherein said hedgehog polypeptide comprises an amino acid sequence at least 95% identical to an amino acid sequence selected from the group consisting of SEQ ID. NO. 8, SEQ ID. NO. 10, SEQ ID. NO. 11, SEQ ID. NO. 12, SEQ ID. NO. 13, and SEQ ID. NO. 14.

L1: Entry 10 of 20 File: USPT Aug 4, 1998

DOCUMENT-IDENTIFIER: US 5789543 A
TITLE: Vertebrate embryonic pattern-inducing proteins and uses related thereto

Detailed Description Paragraph Right (69):
In addition to the implantation of cells cultured in the presence of a functional hedgehog activity and other in vitro uses described above, yet another objective of the present invention concerns the therapeutic application of a hedgehog protein to enhance survival of neurons and other neuronal cells in both the central nervous system and the peripheral nervous system. The ability of hedgehog to regulate neuronal differentiation during development of the nervous system and also presumably in the adult state indicates that hedgehog can be reasonably expected to facilitate control of adult neurons with regard to maintenance, functional performance, and aging of normal cells; repair and regeneration processes in chemically or mechanically lesioned cells; and prevention of degeneration and premature death which result from loss of differentiation in certain pathological conditions. In light of this understanding, the present invention specifically contemplates applications of the subject method to the treatment of prevention and/or reduction of the severity of) neurological conditions deriving from: (i) acute, subacute, or chronic injury to the nervous system, including traumatic injury, chemical injury, vasal injury and deficits (such as the ischemia resulting from stroke), together with infectious/inflammatory and tumor-induced injury; (ii) aging of the nervous system including Alzheimer's disease; (iii) chronic neurodegenerative diseases of the nervous system, including Parkinson's disease, Huntington's chorea, amylotrophic lateral sclerosis and the like, as well as spinocerebellar degenerations; and (iv) chronic immunological diseases of the nervous system or affecting the nervous system, including multiple sclerosis.

L1: Entry 10 of 20 File: USPT Aug 4, 1998

US-PAT-NO: 5789543
DOCUMENT-IDENTIFIER: US 5789543 A

TITLE: Vertebrate embryonic pattern-inducing proteins and uses related thereto

DATE-ISSUED: August 4, 1998

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Ingham; Philip W.	Summertown			GB2
McMahon; Andrew P.	Lexington	MA		
Tabin; Clifford J.	Cambridge	MA		

US-CL-CURRENT: 530/350; 424/185.1, 435/69.1, 530/300

CLAIMS:

What is claimed is:

1. A recombinantly produced polypeptide comprising a hedgehog amino acid sequence which is at least 80 percent identical to a sequence selected from the group consisting of SEQ ID. NO. 2, SEQ ID. NO. 4, SEQ ID. NO. 6, SEQ ID. NO. 8, and SEQ ID. NO. 10, which hedgehog amino acid sequence (i) induces expression of a ptc gene (ii) regulates differentiation of neuronal cells, (iii) regulates survival of differentiated neuronal cells, (iv) regulates proliferation of chondrocytes, (v) regulates spermatogenesis, (vi) induces expression of a Hoxd gene, or (vii) functionally replaces drosopholia hedgehog in transgenic drosophila.

2. A recombinantly produced polypeptide comprising a hedgehog amino acid sequence at least 80 percent identical with a sequence selected from the group consisting of residues 27-189 of SEQ ID. NO. 2, residues 22-187 of SEQ ID NO. 4, residues 1-116 of SEQ ID NO. 6, residues 25-187 of SEQ ID. NO. 8, and residues 24-186 of SEQ ID. NO. 10 which hedgehog amino acid sequence (i) induces expression of a prc gene, (ii) regulates differentiation of neuronal cells, (iii) regulates survival of differentiated neuronal cells, (iv) regulates proliferation of chondrocytes, (v) regulates spermatogenesis, (vi) induces expression of a Hoxd gene, or (vii) functionally replaces drosopholia hedgehog in transgenic drosophila.

3. An isolated polypeptide comprising a hedgehog amino acid sequence of at least 150 amino acid residues encoded by a nucleic acid which hybridizes under highly stringent conditions to a sequence selected from the group consisting of SEQ ID. NO. 1, SEQ ID. NO 3, SEQ ID. NO 5, SEQ ID. NO. 7, and SEQ ID. NO, 9, which hedgehog amino acid sequence (i) induces expression of a prc gene, (ii) regulates differentiation of neuronal cells (iii) regulates survival of differentiated neuronal cells, (iv) regulates proliferation of chondrocytes, (v) regulates spermatogenesis. (vi) induces expression of a Hoxd gene, or (vii) functionally replaces drosopholia hedgehog in transgenic drosophila.

4. An isolated polypeptide comprising a hedgehog amino acid sequence at least 80 percent identical to a sequence selected from the group consisting of SEQ ID. NO. 2, SEQ ID. NO. 4, SEQ ID. NO. 6, SEQ ID. NO. 8, and SEQ ID. NO. 10, which hedgehog

amino acid sequence (i) induces expression of a ptc gene, (ii) regulates differentiation of neuronal cells, (iii) regulates survival of differentiated neuronal cells, (iv) regulates proliferation of chondrocytes (v) regulates spermatogenesis, (vi) induces expression of a Hoxd gene, or (vii) functionally replaces drosopholia hedgehog in transgenic drosophila.

5. A recombinantly produced polypeptide comprising a hedgehog amino acid sequence of at least 150 amino acid residues encoded by a nucleic acid which hybridizes under highly stringent conditions to a sequence selected from the group consisting of SEQ ID. NO. 1, SEQ ID. NO. 3, SEQ ID. NO. 5, SEQ ID. NO 7, and SEQ ID. NO. 9, which hedgehog amino acid sequence (i) induces expression of a pct genes (ii) regulates differentiation of neuronal cells (iii) regulates survival of differentiated neuronal cells, (iv) regulates proliferation of chondrocytes, (v) regulates spermatogenesis, (vi) induces expression of a Hoxd gene, or (vii) functionally replaces drosopholia hedgehog in transgenic drosophila.

6. An isolated polypeptide comprising a hedgehog amino acid sequence including an N-terminal portion of a mature hedgehog protein, said hedgehog amino acid sequence encoded by a nucleic acid which hybridizes under highly stringent conditions to a sequence selected from the group consisting of SEQ ID. NO. 1, SEQ ID. NO. 3, SEQ ID. NO. 5, SEQ ID. NO. 7, and SEQ ID. NO 9.

7. A recombinantly produced polypeptide comprising a hedgehog amino acid sequence including an N-terminal portion of a mature hedgehog protein, said hedgehog amino acid sequence encoded by a nucleic acid which hybridizes under highly stringent conditions to a sequence selected from the group consisting of SEQ ID. NO 1, SEQ ID. NO. 3, SEQ ID NO. 5, SEQ ID. NO. 7, and SEQ ID. NO. 10.

8. An isolated hedgehog polypeptide encoded by a hedgehog gene of a vertebrate organism.

9. The polypeptide of any of claims 3, 4, 5, 6 or 7, wherein said hedgehog amino acid sequence is at least 90 percent identical with a sequence selected from the group consisting SEQ ID. NO. 2, SEQ ID. NO. 4, SEQ ID. NO. 6, SEQ ID. NO. 8, and SEQ ID. NO. 10.

10. The polypeptide of claims 6 or 7, comprising an amino acid sequence encoded by a nucleic acid which hybridizes under stringent conditions to a sequence selected from the group consisting of residues 64-567 of SEQ ID. NO. 1, residues 64-561 of SEQ ID. NO. 3, residues 1-348 of SEQ ID NO. 5, residues 73-561 of SEQ ID NO. 7, and residues 70-558 of SEQ ID NO: 10.

11. An isolated hedgehog polypeptide having at least one biological activity of a vertebrate hedgehog protein, said polypeptide comprising an amino acid sequence at least 80 percent identical with a sequence selected from the group consisting of residues 27-189 of SEQ ID. NO. 2, residues 22-187 of SEQ ID. NO. 4, residues 1-116 of SEQ ID. NO. 6, residues 25-187 of SEQ ID. NO. 8, and residues 24-186 of SEQ ID. NO. 10.

12. The polypeptide of any of claims 2 or 11, wherein said polypeptide includes a hedgehog amino acid sequence at least 90 percent identical with a sequence selected from the group consisting of residues 27-189 of SEQ ID. NO. 2, residues 22-187 of SEQ ID. NO. 4, residues 1-116 of SEQ ID. NO. 6, residues 25-187 of SEQ ID. NO. 8, and residues 24-186 of SEQ ID. NO. 10.

13. The polypeptide of claim 12, wherein said polypeptide includes a hedgehog amino acid sequence at least 95 percent identical with a sequence selected from the group consisting of residues 27-189 of SEQ ID. NO. 2, residues 22-187 of SEQ ID. NO. 4, residues 1-116 of SEQ ID. NO. 6, residues 25-187 of SEQ ID. NO. 8, and residues 24-186 of SEQ ID. NO. 10.

14. The polypeptide of claim 12, wherein said polypeptide includes a hedgehog amino acid sequence identical to a sequence selected from the group consisting of residues 27-189 of SEQ ID. NO. 2, residues 22-187 of SEQ ID. NO. 4, residues 1-116 of SEQ ID. NO. 6, residues 25-187 of SEQ ID. NO.8, and residues 24-186 of SEQ ID. NO. 10.

15. An isolated hedgehog polypeptide comprising an amino acid sequence is encoded by at least a portion of a hedgehog gene of vertebrate origin comprising residues 64-561 of SEQ ID. NO. 3, residues 1-348 of SEQ ID. NO. 5 and residues 73-561 of SEQ ID NO. 7.

16. The polypeptide of any of claims 2, 4, or 11, wherein the hedgehog amino acid sequence is encoded by a nucleic acid which hybridizes under highly stringent conditions to a sequence selected from the group consisting of SEQ ID. NO. 1, SEQ ID. NO. 3, SEQ ID. NO. 5, SEQ ID. NO. 7, and SEQ ID. NO. 9.

17. The polypeptide of claim 6 or 9, wherein the hedgehog gene is a mammalian hedgehog gene.

18. The polypeptide of claim 9, wherein said hedgehog amino acid sequence is at least 95 percent identical with a sequence selected from the group consisting SEQ ID. NO. 2, SEQ ID. NO. 4, SEQ ID. NO. 6, SEQ ID. NO. 8, and SEQ ID. NO. 10.

19. The polypeptide of any of claims 3, 5, 6 or 7, wherein said hedgehog amino acid sequence is identical to a sequence selected from the group consisting SEQ ID. NO. 2, SEQ ID. NO. 4, SEQ ID. NO. 6, SEQ ID. NO. 8, and SEQ ID. NO. 10.

20. The polypeptide of claims 3 or 5, encoded by a nucleic acid which hybridizes under highly stringent conditions to a sequence selected from the group consisting of SEQ ID. NO. 3, SEQ ID. NO. 5 and SEQ ID. NO. 7.

21. The polypeptide of any of claims 3 or 5, wherein said hedgehog amino acid sequence comprising an N-terminal portion of a mature vertebrate hedgehog protein selected from the group consisting of SEQ ID. NO. 2, SEQ ID. NO. 4, SEQ ID NO. 6, SEQ ID NO. 8, and SEQ ID. NO. 10.

22. An hedgehog protein represented in SEQ ID. NO. 2, SEQ ID. NO. 4, SEQ ID. NO. 6, SEQ ID. NO. 8, and SEQ ID. NO. 10.

23. The polypeptide of any of claims 1, 2, 3, 4 or 15, which polypeptide is a fusion protein.

24. The polypeptide of any of claims 1, 2, 3, 4, 5, 6, 7, 8, 11, or 15 which polypeptide is postranslationally modified.

25. The polypeptide of claim 24, which polypeptide is glycosylated.

26. The polypeptide of any of claims 1, 2, 3, 4, 5, 6, 7, 8, 11, or 15, wherein the polypeptide promotes differentiation of neuronal cells or survival of differentiated neuronal cells.

27. The polypeptide of claim 26, wherein the neuronal cell is a dopaminergic neuron.

28. The polypeptide of claim 27, wherein the neuronal cell is a motorneuron.

29. The polypeptide of any of claims 1, 2, 3, 4, 5, 6, 7, 8, 11, or 15, wherein the polypeptide regulates proliferation of chondrocytes.

30. The polypeptide of any of claims 1, 2, 3, 4, 5, 6, 7, 8, 11, or 15, wherein the polypeptide regulates spermatogenesis.

31. The polypeptide of any of claims 1, 2, 3, 4, 5, 6, 7, 8, 11, or 15, wherein the polypeptide induces expression of a Hoxd gene.

32. The polypeptide of any of claims 1, 2, 3, 4, 5, 6, 7, 8, 11, or 15, wherein the polypeptide induces expression of a ptc gene.

33. The polypeptide of any of claims 1, 2, 3, 4, 5, 6, 7, 8, 11, or 15, which polypeptide ectopically replaces drosopholia hedgehog in a transgenic drosophila fly.

34. The polypeptide of any of claims 3, 4, 5, 8 or 11, wherein the polypeptide is purified to at least 80% by dry weight.

35. The polypeptide of claim 34, wherein the polypeptide is purified to at least 95% by dry weight.